

**ABSTRACT**

5 A magnetic sensor is disclosed in which a ferromagnetic runner (e.g.,  
a permalloy runner) can be located relative to a target. A coil structure is  
generally wound about the ferromagnetic runner, such that when a magnetic  
field changes direction along an axial length of the ferromagnetic runner, a  
voltage is induced in the coil structure that is proportional to a time range of  
change of a magnetic flux density, due to the sudden internal magnetization  
10 reversal of the runner. Additionally, an interfacing circuit can be provided in  
which the ferromagnetic runner and the coil structure are integrated with the  
interfacing circuit to thereby produce a magnetic sensor for magnetically  
sensing the target. The magnetic sensor is highly sensitive and can operate  
without electrical current or upon a negligible electrical current.